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| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
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| 10/724,033 | 11/26/2003 | Alexei A. Erchak | 16459-008001 | 7277 |
| 26161 | 7590 | 09/01/2005 | EXAMINER | |
| FISH & RICHARDSON PC P.O. BOX 1022 MINNEAPOLIS, MN 55440-1022 | | | WON, BUMSUK | |
| | | | ART UNIT | PAPER NUMBER |
| | | | 2879 | |

DATE MAILED: 09/01/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

| | | | |
|------------------------------|--------------------------------------|--------------------------------------|--|
| Office Action Summary | Application No. 10/724,033 | Applicant(s) ERCHAK ET AL. | |
| | Examiner Bumsuk Won | Art Unit 2879 | |

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 26 November 2003.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-35 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-35 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 16 February 2005 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date 10/04, 1,3,8/05.
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____.

DETAILED ACTION

Drawings

1. The drawings are objected to because figure 13 does not have x-axis (or bottom axis) described, and for y axis (or left side axis), the label “ extraction” should be “ extraction efficiency” and the numbers on the y axis should be 10, 20, 30, ... instead of 0.1, 0.2, 0.3, ... Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. The figure or figure number of an amended drawing should not be labeled as “ amended.” If a drawing figure is to be canceled, the appropriate figure must be removed from the replacement sheet, and where necessary, the remaining figures must be renumbered and appropriate changes made to the brief description of the several views of the drawings for consistency. Additional replacement sheets may be necessary to show the renumbering of the remaining figures. Each drawing sheet submitted after the filing date

of an application must be labeled in the top margin as either “ Replacement Sheet” or “ New Sheet” pursuant to 37 CFR 1.121(d). If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

Specification

2. Applicant is reminded of the proper content of an abstract of the disclosure.

A patent abstract is a concise statement of the technical disclosure of the patent and should include that which is new in the art to which the invention pertains. If the patent is of a basic nature, the entire technical disclosure may be new in the art, and the abstract should be directed to the entire disclosure. If the patent is in the nature of an improvement in an old apparatus, process, product, or composition, the abstract should include the technical disclosure of the improvement. In certain patents, particularly those for compounds and compositions, wherein the process for making and/or the use thereof are not obvious, the abstract should set forth a process for making and/or use thereof. If the new technical disclosure involves modifications or alternatives, the abstract should mention by way of example the preferred modification or alternative.

The abstract should not refer to purported merits or speculative applications of the invention and should not compare the invention with the prior art.

Where applicable, the abstract should include the following:

- (1) if a machine or apparatus, its organization and operation;
- (2) if an article, its method of making;

- (3) if a chemical compound, its identity and use;
- (4) if a mixture, its ingredients;
- (5) if a process, the steps.

Extensive mechanical and design details of apparatus should not be given.

The abstract of the disclosure is objected to because the content is not descriptive. Correction is required. See MPEP § 608.01(b).

3. The disclosure is objected to because of the following informalities: The title on the specification is different from the title on the oath/declaration. Appropriate correction is required.

4. The disclosure is objected to because of the following informalities: The term " tow" should be " two" on page 6, lines 8, 17, and 26). Appropriate correction is required.

Claim Objections

5. Claim 32 is objected to because of the following informalities: Claim 32 is exactly same as claim 31. Appropriate correction is required.

Claim Rejections - 35 USC § 112

6. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

7. The term "about" in claims 1, 3, 7-8, 10, 13, 16, 31-32, and 35 is a relative term which renders the claim indefinite. The term "about" is not defined by the claim, the specification does not provide a standard for ascertaining the requisite degree, and one of ordinary skill in the art would not be reasonably apprised of the scope of the invention. Correction is required.

8. Claims 3 and 35 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. The term " features" is not descriptive. For examining purpose, the term " features" will be used as the thickness of the surface (layer) of the first layer.

Claim Rejections - 35 USC § 102

9. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

10. Claims 1, 3-6, 8-20, 22-26, 31-32, and 35 are rejected under 35 U.S.C. 102(b) as being anticipated by Camras (US 6,784,463).

Regarding claims 1 and 8, Camras discloses a light-emitting device, comprising:

a multi-layer stack of materials (note figure 2A) including a light-generating region (note figure 2A, item 112), and a first layer (note figure 2A, item 126b) supported by the light-generating region, a surface of the first layer being configured so that light generated by the light-generating region can emerge from the light-emitting device via the surface (note figure 2A, item 128) of the first layer; and a material in contact with the surface of the first layer, the material having an index of refraction less than about 1.5 (note

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column 12, lines 5-7, Camras discloses high refractive index is greater than 1.5, and it would be obvious to one of ordinary skill in the art to know that Camras refers low refractive index being less than 1.5, and Camras also discloses in column 12, line 5 that air can be one of the layer material which has refractive index equal to 1), wherein the light emitting device is packaged (note column 2, lines 37-38, figure 4).

Regarding claims 3 and 35, Camras disclose the surface (note figure 2A, item 126a) of the first layer has features with a size of less than about $\lambda/5$, where λ is a wavelength of light that can be emitted by the first layer (note column 7, lines 56-58, " 500 Angstroms" , the wavelength that is emitted from the LED is between 4000 and 7500 Angstroms, thus, 500 Angstrom is less than 1/5 of the wavelength that is emitted from the LED).

Regarding claim 4, Camras discloses the light emitting device is in the form of a packaged die (note column 2, lines 37-38, and figure 4, item 130).

Regarding claims 5 and 6, Camras discloses the material comprises air (note column 12, lines 2-7).

Regarding claim 9, Camras discloses the packaged light emitting device is free of an encapsulant material (note column 13, lines 38-41).

Regarding claim 10, Camras disclosed the light emitting device comprising, in part, a cover (note figure 2A, item 117), the material (note figure 2A, item 126a) having an index of refraction of less than about 1.5 (note column 12, lines 5-7, Camras discloses high refractive index is greater than 1.5, and it would be obvious to one of ordinary skill in the art to know that Camras refers low refractive index being less than 1.5, and Camras also discloses in column 12, line 5 that air can be one of the layer material which has refractive index equal to 1) being between the cover and the surface of the first layer.

Regarding claim 11, Camras discloses the cover comprises a phosphor material (note column 14, lines 33-40).

Regarding claim 12, Camras discloses the cover is configured so that light generated by the light-generating region that emerges via the surface of the first layer can interact with the phosphor material, and so that light that emerges via the surface of

the first layer and interacts with the phosphor material emerges from the cover as substantially white light (note column 14, lines 13-19, 29-40).

Regarding claim 13, Camras discloses the light-emitting device of claim 1, further comprising: a first sheet (note figure 2A, item 117) comprising a material that is substantially transparent to light that emerges from the light-emitting device (note column 2, lines 55-57); and a second sheet (note figure 2A, coated on top of item 117, column 14, line 33) comprising a phosphor material, the second sheet being adjacent the first sheet (note column 14, lines 33-40), wherein the material having an index of refraction of less than about 1.5 (note column 12, lines 5-7) is between the first sheet (note figure 2A, item 117) and the surface of the first layer (note figure 2A, item 126b).

Regarding claim 14, Camras discloses the first (note figure 2A, item 117) and second sheet (note figure 2A, coated on top of item 117, column 14, line 33) being configured so that light generated by the light-generating region that emerges via the surface of the first layer can interact with the phosphor material, and so that light that

emerges via the surface of the first layer and interacts with the phosphor material

emerges from the second sheet as substantially white light (note column 14, lines 13-19, 29-40).

Regarding claim 15, Camras discloses the light emitting device comprising, in part, a support (note figure 4, item 130) that supports the multi layer stack of materials (note figure 4).

Regarding claims 16 and 31-32, Camras discloses the light-emitting device, further comprising a layer of reflective material (note figure 4, item 118) that is capable of reflecting at least about 50% of light generated by the light-generating region that impinges on the layer of reflective material (note column 6, lines 35-41), the layer of reflective material being between the support (note figure 4, item 130) and the multi-layer stack of materials (note figure 4).

Regarding claim 17, Camras discloses the reflective material (note column 6, lines 35-41, and figure 4, item 118) is a heat sink material (note column 6, lines 19-23, “ aluminum”).

Regarding claims 18 -20, Camras discloses the heat sink material (note figure 4, item 118) is configured so that the heat sink material has a vertical heat gradient during use of light emitting device (note figure 4, the heat generated from the light emitting region (112) will conduct heat vertically through the heat sink material (118) so that the heat conducts to support (130).) Camras also discloses that the heat sink material (note figure 4, item 118) is disposed adjacent the support (note figure 4).

Regarding claims 22-23, Camras discloses the light emitting device comprising, in part, electrical contacts (note figure 1, items 18 and 20) configured to vertically inject electrical current into the light emitting device (note column 1, lines 52-56).

Regarding claim 24, Camras discloses the light emitting device is selected from the group consisting of light-emitting diodes, lasers, optical amplifiers, and combinations thereof (note column 1, lines 36-41).

Regarding claim 25, Camras discloses the light emitting device comprises a light emitting diode (note column 1, lines 36-41).

Regarding claim 26, Camras discloses the light emitting device is selected from the group consisting of OLEDs, flat surface-emitting LEDs (note figure 7a and 7c has flat surface on the light emitting or viewer side), HBLEDs, and combinations thereof.

Claim Rejections - 35 USC § 103

11. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

12. Claims 2, 27-30, and 33-34 are rejected under 35 U.S.C. 103(a) as being unpatentable over Camras (US 6,784,463) in view of Krames (US 5,779,924).

Regarding claims 2 and 33-34, Camras discloses all of the claimed limitations except for the surface of the first layer has a dielectric function that varies spatially

according to a pattern, wherein the pattern is a nonperiodic pattern or a complex periodic pattern.

Krames discloses a light emitting device, wherein the surface of the first layer (note figure 8, item 1 with castle like feature) has a dielectric function that varies spatially according to a pattern (note figure 8), for the purpose of enhancing light extraction and improve the performance of the device (note abstract, lines 5-6), wherein the pattern is a nonperiodic pattern (note figure 5b) or a complex periodic pattern (note figure 5c).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to have the surface of the first layer with a dielectric function that varies spatially according to a pattern disclosed by Krames applied to the light emitting device disclosed by Camras, for the purpose of enhancing light extraction and improve the performance of the device.

Regarding claim 27, Krames disclose a pattern with an ideal lattice constant and a detuning parameter with a value greater than zero (note column 4, lines 22-27, and figures 5a-5c).

The reason for combining is the same as for claims 2 and 33-34 above.

Regarding claims 28-30, Krames discloses the pattern does not extend into the light generating region (note figure 3A, item 112) (note figure 3A), the pattern does not extend beyond the first layer (note figure 7c), or the pattern extends beyond the first layer (note figure 10).

The reason for combining is the same as for claims 2 and 33-34 above.

13. Claim 7 is rejected under 35 U.S.C. 103(a) as being unpatentable over Camras (US 6,784,463).

Regarding claim 7, Camras discloses all of the claimed limitations except for the pressure of the gas is less than about 100 Torr.

It would have been obvious to a person of ordinary skill in the art at the time the invention was made to use a pressure of the gas being less than about 100 Torr in the

light emitting device disclosed by Camras, for the purpose of using the light emitting device in an application which requires specific gas pressure.

14. Claim 21 is rejected under 35 U.S.C. 103(a) as being unpatentable over Camras (US 6,784,463) in view of Huang (US 2004/0043524).

Regarding claim 21, Camras discloses all of the claimed limitations except for a current spreading layer being located between the first layer and the light generating region.

Huang discloses a current spreading layer (note figure 2A, item 60) being located between the first layer (note figure 2A, item 70) and the light generating region (note figure 2A, item 40).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to have a current spreading layer between the first layer and the light generating region disclosed by Huang in the light emitting device disclosed by Camras, for the purpose of increasing current flow for brighter light emission.

Contact information

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Bumsuk Won whose telephone number is 571-272-2713. The examiner can normally be reached on Monday through Friday, 8:00 am to 5:00 pm.


If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nimeshkumar Patel can be reached on 571-272-2457. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



Bumsuk Won
Patent Examiner


JOSEPH WILLIAMS
PRIMARY EXAMINER